

REMARKS ON THE LITERATURE OF THE
EARLIER STAGES OF THE CYLINDROTOMINA,
A SECTION OF THE TIPULIDÆ.

By BARON C. R. OSTEN SACKEN, Hon. F.E.S.

IN the Monograph of North American Diptera, iv., pp. 289-308 (1869), in giving an account of the Section Cylindrotomina, I introduced whatever was known about their life-history at that time. Very little has been added to our knowledge since. What I have done now is to overhaul the existing literature for a second time, and to prepare a detailed digest of it, arranged under the headings of the three principal genera of the section. It will be seen that with this mode of treatment the peculiarities of the larvæ and pupæ of the Cylindrotomina are brought out with more distinctness than they were in my work of 1869, and that these peculiarities fully bear out the intermediate position which I have given to that section between the *Tipulidæ longipalpi* and *brevipalpi*. This intermediate position has been further justified by the discovery that, during the Oligocene period in Western North America, the Cylindrotomina were, apparently, much more common than now, and that, for this reason, they may be considered as the ancestral form among the present Tipulidæ. Many specimens were found in the fossiliferous strata about Florissant, Colorado, and the White River, Utah. Whether they represent as many species as Mr. Scudder makes out of them, remains to be seen. (Compare Scudder, Tertiary Tipulidæ, Proc. Am. Phil. Soc., xxxii., 1894.)

The three genera of Cylindrotomina, about the transformations of which I reproduce the (in one case hypothetical) literature, are:—*Phalacrocera*, Schin., *Cylindrotoma*, Macq., and *Triogma*, Schin. The life-history of the genus *Liogma*, introduced by me (Monogr., iv., p. 298, 1869), is as yet unknown.

1. PHALACROCERA, Schin.

- De Geer* (Nova Acta Upsal., i., pp. 66-77, Tab. 6 (1773); Mém. Hist. Ins., vi., p. 351, Tab. xx., figg. 1-16 (1776).—An excellent description of the external form and habits of the larva, pupa, and imago of *Phalacrocera replicata*, Linn.
- Grube* (Jahresb. d. Schles. Ges. für Vaterl. Kultur, 1867, p. 59).—A rather detailed description of evidently the same larva, but not identified.
- Engel* (Ent. Nachr., 1884, p. 260).—Short notice of the discovery by him of the same larva upon the stems of *Ranunculus fluitans*, in a lake, in the vicinity of Frankfurt-on-the-Oder.
- Giard, Prof. A.* (Bull. Soc. Ent. France, 1895, p. ccxxxv.).—An interesting notice of the same larva, which he found in pools of water among the downs between Winiereux and Ambleteuse (Dépt. Pas de Calais), hidden in the aquatic moss, *Hypnum elodes*, Spruce. He quotes a number of other continental stations.

2. CYLINDROTOMA, Macq.

- Schellenberg* (Genres des Mouches Diptères, Zürich, 1803).—In French and German. Tab. xxxvii., fig. 1, represents a *Tipula*, wrongly named in the corresponding letter-press (pp. 22-23) *Tipula histrio*, Fabr. As I pointed out in 1869 (Mon., p. 299), the figures of the larva and pupa make it evident that the species is *Cylindrotoma distinctissima*, Meig. The text merely says, "We know this larva, which has been found on *Viola biflora*, Linn.; we shall give its history in another place." This promised publication has, to my knowledge, never appeared.
- Boie* (Kröyer Naturh. Tidskr. ii., p. 234, 1838; half a page).—Boie did not know of Schellenberg's publication. He gives a short description of the larva and pupa, which answers to Schellenberg's figures. He adds: "It deserves to be noticed that the *green* colouring of the larva indicates quite a different mode of life from that of other Tipulidæ. Numerous congregations of them were

observed gnawing the leaves of *Stellaria nemorum* in shady places among woods about the end of August. The transformation took place on the stems of the plants, to which the pupæ adhere by the tail, just like the chrysalids of butterflies. The fly develops about the middle of September."

Zeller, P. C. (Dipterologische Beiträge, 2te Abth., Isis, 1842, pp. 807-809.—*Limnobia distinctissima*, Wied., Meig.). Zeller refers to Boie, but deems it useful to give a more detailed description. He found the larvæ near Glogau (Silesia) in the spring, on leaves of *Anemone nemorosa*; in some places they occurred abundantly. The larvæ generally remain on the underside of the leaves, and by gnawing, make holes in them. About the middle of May they leave their food plants, fasten themselves upon grass-blades, leaves, etc., and usually pupate on the very next day; the pupæ show a remarkable analogy to those of the genus *Pterophorus* (Lepidoptera). They hang fastened by the tail of the larva-skin, which is not stripped off the last three or four segments. Zeller gives a more detailed description of the larva and pupa than his predecessors. It results from the preceding statements that the larva of *Cyl. distinctissima* occurs on various phanerogamous plants—*Viola*, *Stellaria*, and *Anemone*, and that it has, at least in some localities, two generations, one in the spring (Schellenberg, Zeller) and the other in autumn (Boie).

3. The supposed larva of TRIOGMA.

G. de Rossi (Ent. Nachr. 1876, pp. 30, 31) describes a peculiar larva which he had discovered in woods, upon a species of moss (*Hypnum*), among which it was hidden. He succeeded in rearing the pupa, but unfortunately the pupa produced only an Ichneumon. As he had not made a description of the larva before its pupation, he published an account of it from memory. In this account I recognised the larva of a Tipulid belonging to the Section *Cylindrotomina*. A short article, which I published about it in the same periodical (Ent.

Nachr. 1878, p. 5), contains the following statement:—"The three-fold branches of the thorn-like processes (die dreifach verästelten Dornen) of the larva of De Rossi, remind one of the aquatic larva described by De Geer, and as this new larva seems to hold the middle place between the terrestrial larva of *Cylindrotoma* and the aquatic one of De Geer, it seems to me possible and even probable, that it may belong to a third of the known genera of the Section *Cylindrotomina*, *Triogma*. This supposition seems to be supported by the fact that this larva, like the aquatic larva of *Phalacroceræ*, feeds upon a species of moss (*Hypnum*), differing in this from the larva of *Cylindrotoma*, which, as we have seen, occurs on different kinds of phanerogamous plants."

In the Monograph of North American Diptera, iv., pp. 289-292, I have shown that the *Cylindrotomina* occupy an intermediate position between the two great, and otherwise very well defined, divisions of the Tipulidæ, the *longipalpi* and *brevipalpi*. And I have called attention (*l. c.* p. 295) to the anomalous character of their larvæ, corresponding with that of the perfect insects. Larvæ climbing upon living plants, feeding upon them, and gnawing holes in their leaves, are *toto cælo* different from ordinary larvæ of Tipulidæ. These larvæ must of course show corresponding adaptations for such a mode of life, and it will be the task of future investigators to describe these structural differences in detail. What we can gather from the existing descriptions is very little, and is found principally in Zeller. According to him, climbing is made possible by sucking-cups, the principal one of which is produced by the withdrawal of the head into the thoracic segments, thus forming a hollow, the edges of which complete the cup. He believes that eight pairs of conical, fleshy protuberances on the ventral side when withdrawn, may likewise act as sucking-cups for locomotion. Zeller's statement about the breathing apparatus proves that the larvæ of *Cylindrotoma distinctissima* are *metapneustic*, like those of *Phalacroceræ* and other Tipu-

lidæ. He says—"The translucent tracheæ end, a short distance from the anus, on the dorsal side, in two brown, very distinct spiracles; their anterior end is not visible, because, in the anterior segments, they lie deeper from the surface."

The pupæ of the *Cylindrotomina* are also very peculiar; they are fastened to the food plants, and resemble the pupæ of some *Lepidoptera*.

PLATES VIII.-XI.

[*The explanation faces the PLATES.*]